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MOUNTAINEERING IN ALASKA.

BY

ISRAEL C. RUSSELL.

An approximate estimate of the difficulties to be overcome in climbing various mountains can be had by comparing the height and distance of their summits, above and beyond the highest point at which a camp-fire is available without transporting fuel.

When camp-fires can be had not only is there no necessity for carrying alcohol or oil, together with the necessary apparatus for burning it, but one can exist with less covering, especially when sleeping, and also requires less food than when camping above "timber-line." We should also note the advantages gained from the feeling of security and comfort that a blazing fire brings to the weary and perhaps storm-bound explorer. It is generally true, also, that climbing is comparatively easy on slopes where plants, especially trees, can grow; thus making it even more evident that the main difficulties awaiting a mountaineer are concentrated above the upper limit of tree-growth, or the timber-line.

If we measure the difficulties of climbing the mountains of America by the standard suggested above certain interesting facts appear. On Chimborazo, the highest point where a camp-fire is available is at an altitude of about 15,000 feet. The height of the mountain, according to Whymper, is 20,545 feet, thus leaving approximately 6,000 feet as a measure of the actual mountaineering required in order to reach the highest summit in the New World.

The great volcanoes of Mexico are a little over 18,000 feet high, and the timber-line may be taken at 14,000 feet. In the Sierra Nevada the highest summit, Mt. Whitney, has an elevation of

14,522 feet, and trees cease to thrive at about 11,000 feet, leaving but three or four thousand feet of the ascent in which a camp-fire cannot be had without transporting fuel. Mt. Shasta and Mt. Tacoma each have elevations of about 14,500, and rise some seven thousand feet above the encircling forests. In the Rocky Mountains the upper limit of vegetation is somewhat greater than on the peaks just named, and besides the massiveness of the uplifts and the general absence of sharp crests and spine-like peaks makes them comparatively easy of ascent.

In all of the instances referred to above, which include the highest mountains in North America south of the Alaskan region, the distance to be traversed between the highest camp-fire and the objective point is at the most only a few miles.

The usual plan for ascending lofty mountains is to establish a camp at the highest accessible point at which a fire can be had without transporting fuel, and then to "hold on" until the weather is favorable, and with but slight impedimenta make a dash for the top. If the first attempt fails, a retreat can be made to the timber-line camp, where safety is assured, and another attack can be undertaken when the conditions are again favorable. In the case of most of the mountains referred to in the last paragraph, the timber-line can be reached by pack animals,—indeed, in many instances mules may be taken to the actual summit—thus making it practicable to secure a base of operation with a comparatively small expenditure of time and energy.

As the timber-line decreases in elevation from the tropics toward either pole, the difficulties to be expected in climbing various peaks of about the same height are indicated in a rough way by their latitude. The lower limit of perpetual snow in the tropics is about 18,000 feet, and it descends lower and lower toward both the north and south. The mountains in high latitudes are frequently sheathed from summit to base in snow-fields and glaciers, thus vastly increasing the obstacles that one has to overcome in order to reach their tops.

The highest mountains in North America are in Alaska and the adjacent part of Canada, where the timber-line is low and glaciers descend to sea-level. In the neighborhood of Mt. Logan, 19,500 feet high, and so far as known the highest summit on this continent, and of Mt. St. Elias, with an altitude of 18,023 feet, the timber-line is only 1,500 or 2,000 feet above the sea. Not infrequently the highest available camp-fire in that region is considerably below the upper limit of timber growth. To reach the summit of

Mt. Logan, or Mt. St. Elias, one is obliged to travel not less than fifty and probably fully seventy-five miles in each instance, after leaving the cheerful blaze of the last camp-fire. When one considers the amount of fuel, provisions, clothing, blankets, tents, etc., required for so long a trip in the snow, he will begin to appreciate the difficulties and hardships of such an undertaking.

With this general statement of the comparative difficulties of mountaineering in different latitudes, I wish to invite the reader's attention to some features of the second of two attempts made by the writer to reach the summit of Mt. St. Elias.*

On June 6, 1892, I reached Icy Bay, the nearest point on the coast to Mt. St. Elias, on the U. S. Revenue steamer *Bear*, in command of Captain M. A. Healy. Icy Bay is a misnomer, as there is no indentation of the coast at that locality. A landing had to be made through the surf on an open beach, the character of which was unknown. The transfer of my party and of our stores from the vessel to the shore was made in small boats, in command of the Lieutenants of the *Bear*. This difficult task was carried out with both bravery and skill, but, unfortunately, four of the boats capsized in the surf, and from one of them, containing seven men, only one man reached shore alive. The provisions and instruments carried in the boats that capsized were washed ashore and picked up on the beach. The boats that did not meet with serious trouble took in more or less water, so that nearly all of our supplies ran the risk of being water-soaked. Owing to careful packing, however, and to the fact that the greater part of our rations were secured in tin cans, securely soldered, but little damage was done.

Our first camp was in a beautiful flower-decked meadow, beneath young spruce trees. After "caching" such articles as were not needed for the inland journey, on a raised platform where they would be out of the reach of bears, we began the line of our march toward Mt. St. Elias.

My companions were five in number, one of the original party, W. C. Moore, having been drowned. Three of the men were with me on a similar expedition the year previous, and had acquired some experience in mountaineering; the others were familiar with frontier life and well qualified for the hardships before them. We had no

* "An Expedition to Mt. St. Elias, Alaska," in *National Geographic Magazine*, (Washington, D. C.), Vol. 3, 1891, pp. 55-200.

"Second Expedition to Mt. St. Elias, Alaska," in *Thirteenth Annual Report of the Director of the U. S. Geological Survey*, 1891-2, pp. 1-91. Washington, D. C., 1894.

pack animals, and all of our "outfit" had to be carried on our backs, or *packed*, to use the technical language of the frontier.

For about two miles northward from the first camp, our route was across a smooth sand-plain, on which travelling was easy, except that a number of swift, muddy streams of ice-cold water had to be forded. One of these streams, too deep and swift to wade, was crossed by means of a rude foot-bridge made of logs carried with much labor from the adjacent forest. The bridge was swept away a few hours after being built, thus compelling two of the camp hands and myself to swim the icy water, upon returning to the base camp a few days later.

At the northern margin of the sand-plain traversed during the first march, we reached the southern border of the great ice-sheet, known as Malaspina glacier, which intervenes between Mt. St. Elias and the Pacific. The margin of the glacier where we first reached it is about 500 feet high and densely forest-covered. The forest grows not only about the margin of the glacier, but extends up over its steep border and covers the extremely rough moraines resting on stagnant ice for four or five miles inland. The vegetation is exceedingly dense. Spruce trees three feet in diameter fringe the outer margin and between their sturdy trunks there is a tangled growth of alders, aspens, ferns and other plants growing in tropical luxuriance.

Through this almost impassable jungle we were obliged to cut a trail with axes and hunting knives, before our packs could be advanced. Reaching the inner border of the forest-covered moraine, we had before us a vast expanse of barren moraine broken by thousands of crevasses, and diversified by pits and hollows holding lakes. Between the lakes rose huge pyramids and spires of ice of the most rugged description, each one sheathed with stones and dirt, which furnished only an insecure foothold. Our route lay across this desolate, lifeless area for a distance of ten or twelve miles to the clear ice beyond. This portion of our journey was exceedingly fatiguing. A single day's march over the loose, angular stones made such sad havoc with our shoes, that repairs were required almost every night.

In making a direct march from the coast to Mt. St. Elias, on the line chosen, the last place where a camp-fire can be had is at the inner margin of the forest-covered moraine, at an elevation of less than 1,000 feet above the sea and about seven miles inland. The only available route to the summit of Mt. St. Elias is by way of the Agassiz glacier, which curves about the eastern base of the mountain

and receives a tributary ice stream, known as Newton glacier, from its northern side. As my object was especially to study the glaciers and the geology of the region explored, we did not take the most direct route, but for this and other reasons, made a detour to the west and visited the Chaix hills which rise through the Malaspina glacier and attain an elevation of 3,000 feet above its surface. The southern base of this rugged island in the ice, is forested and affords excellent camping places at an elevation of between 1,500 and 2,000 feet. We there established our highest "fire camp" and making a reassortment of instruments and supplies, took with us to the higher regions only what seemed strictly essential. Our highest camp-fire was at least 16,000 feet lower than the peak we wished to climb and by the only available route, without considering minor deflections, not less than twenty-five miles from it. Every rod of this distance was over glaciers and snow-fields. During much of this toilsome march we threaded our way through a net-work of crevasses, so that the actual distance traversed was much nearer fifty than twenty-five miles.



CROSSING MALASPINA GLACIER. A MOMENT'S REST.

At the Chaix hills I encamped alone for five days, while my companions were advancing the packs across the barren moraines of the Malaspina glacier to the clear ice in its central portion, where a temporary cache was made. My camp was by the side of a broad game-trail on which fresh tracks of huge bears were abun-

dant. During my stay I explored the neighboring region, and with much labor cut spruce trees and built a sled with which to continue the journey across the clear ice of the Malaspina glacier and up the Agassiz glacier. The task of constructing a sled was difficult, as trees with the required curvature for runners had to be cut on steep slopes, and in one instance on the side of a precipice where a slip would have been fatal. After securing the necessary sticks, they had to be hewed and sawed into shape with tools that were inadequate for the purpose. With the aid of a few nails and some copper wire, a sled was finally made that was strong, if not beautiful, and afterward did good service. When the men rejoined me, we cut a large spruce tree having a curved trunk and hewed out a toboggan. The sled and toboggan were then carried across the rough moraine bordering the Chaix hills on the east, to the cache that had been made on the clear ice, and the march northward renewed. Owing to the roughness of the ice at the start, the toboggan became so frayed and torn that it was soon rendered useless and had to be abandoned. By making double trips with the sled, the supplies were at length advanced to the foot of the lowest ice-fall in the Newton glacier. The sled was then left, and is now probably being carried slowly southward by the flowing ice. It will perhaps be found during the years to come, on the border of the Malaspina glacier to the east of the Chaix hills.

After leaving our comfortable and exceedingly picturesque camp at the Chaix hills, we were enabled at our first camping place to pitch our tents on a thin moraine, composed of fragments of black slate, on the margin of the clear ice of the Malaspina glacier. At the next advance we found a luxuriant carpet of mosses and flowers, on which to spread our blankets, at the extreme western end of the Samovar hills. Above the Samovar hills, however, every camp was on the open snow-fields, at a sufficient distance from neighboring precipices to be safe from avalanches.

During our sojourn in the snow we used tents of light, cotton cloth, seven feet square, supported by a ridge rope, the ends of which were usually made fast to alpenstocks. At the corners, the tent was held down by packs, cans of provisions, and, in fact, anything that could be extemporized for the purpose. At times hunting knives were used for tent pins. On two occasions when it was necessary for me to pitch a tent without assistance, having only one alpenstock to use for a tent pole, I piled up snow so as to form a slender column three or four feet high to support the tent at the rear. Water poured over the column soon froze and held the snow

firmly. The base of the tent was then pressed into the snow and water poured on and allowed to freeze. My tent was thus "frozen up," as one might say, instead of being "pinned down."

Our cooking was done over a double-wick, coal-oil stove, provided with a tin reservoir. Oil was carried in one-gallon cans, as hand packs. Our provisions consisted principally of "flap-jacks," made of wheat flour and corn meal, and fried meat, either bacon, corn beef or pemican, and coffee. But little tea was used. Some of our camps were near shallow pools on the snow, from which water was obtained; at other times we were enabled to draw water from crevasses by means of a bucket attached to a line; usually, however, we had to melt snow or ice in order to obtain the water necessary for drinking and cooking. As to washing, a handful of snow rubbed over the face and hands was our only means of bathing during the weeks we were above where a camp-fire was available. Of clothing, we had a good supply of woollen garments, including thick flannel shirts and heavy, knit socks. Each man had also one double woollen blanket in which to sleep at night. During several nights, which will be long remembered on account of their discomforts, I slept on the névé of the Newton glacier, with two companions under one blanket, supplemented by oil coats and a top and bottom layer of canvas.

No alcoholic liquors of any kind were taken; although a small supply in case of accident would have been advisable. Several of the party indulged in the use of tobacco. In our lonely camps in the snow, when fierce storms threatened to carry away our frail shelter, a grateful pipe brought rest and contentment that even the most ardent reformer would have been pleased to see. Many were the tales of frontier life and adventure told under the influence of that mild sedative. I would like to enlarge upon some of these stories, if enlargement were possible, and to preserve them in a permanent form, but space will not allow of such a digression.

Fur garments and fur sleeping bags would have been unavailable even if we had taken them, for the reason that we were frequently exposed to rain and had to sleep many times on snow saturated with water. Fur clothing is unquestionably the best that can be had when the temperature is below freezing; but nothing is more uncomfortable when water-soaked. In addition to our woollen garments, each man was provided with an oil-coat and a "sou'wester." Our blankets were rolled in canvas to protect them when travelling and serve as a substratum together with oil-coats when sleeping.

The equipment described above will no doubt seem inadequate

to many who are not accustomed to "roughing it"; but thus provided, we lived for five weeks on the broad snow-fields without a single camp-fire to warm our benumbed fingers or to dry our clothing. Even when protected from the rain by water-proof coats, our garments, while carrying heavy packs, became wet with perspiration and rendered exceedingly uncomfortable. In spite of long exposure and reduced rations, every one of the party enjoyed the best of health and returned to civilization stronger and more rugged than at the beginning of the season.

Packs, weighing about fifty pounds, were carried by each man, by means of "pack straps" made of several strands of hemp-line, known as "cod-line," and intended for use in cod fishing. These lines were chosen instead of leather straps, not only because of their lightness, but for the reason that in cases of necessity the "straps" could be quickly undone and used as life-lines. We also had ropes for fastening ourselves together in the usual manner when travelling over crevassed snow. Each man was provided with a hickory alpenstock, seven feet long and one and one-fourth inches in diameter at the centre, tapering to one inch in diameter at the ends. These were furnished at one extremity with a steel spike about three inches long, with a hook near the ferrule, after the manner of boat-hooks; the other extremity was armed with a chisel with a cutting edge two and one-half inches broad. The chisels enabled one to cut steps on descending slopes, and to clear away the loose snow on the opposite side of a crevass across which it was necessary to spring. In these and many other ways our strong alpenstocks were found to be of great service. Instead of the conventional ice-axe, we carried smaller implements of the same general pattern, with handles 16 inches long. These ice-hatchets, as they may be called, were tied to our packs when travelling, and only carried in the hand when actually required for cutting steps. Colored glasses were indispensable, and were worn when we travelled during the day. Our shoes were of the strongest make available, but were constantly in need of repairs. Material for cobbling was provided, but the demand for leather for patches became so great that instrument cases had to be sacrificed for that purpose. While crossing the rough moraines near the coast, our shoes were shod with broad headed nails of soft iron, supplemented with spikes and sharp-headed screws when we reached the clear ice. At greater elevations, where the snow was soft, the long spikes used by lumbermen when walking on floating logs, were added to what remained of the armament previously employed.

Owing to the high latitude in which Mt. St. Elias is situated, the summer days are long. During the greater part of our stay above timber-line, it was light enough when the sky was clear, even at midnight, for one to read ordinary print or to write notes. This enabled us to make night marches and avoid the intense glare of the sunlight reflected from the snow. At night, the temperature usually fell below freezing, and the snow, softened during the day so as to be quite impassable, became sufficiently hardened to be traversed with comparative ease. Another advantage of travelling by night was that we could sleep during the day when the air was warm. The night marches were frequently enjoyable, owing to the exquisite beauty of the white-robed mountains when illuminated by the soft twilight. At night, the sun declined only about eight degrees below the northern horizon, and the glories of the after-glow were frequently prolonged until they merged with the radiance of the succeeding morning.

In ascending the Newton glacier, our route lay through a region of magnificent ice-falls, some of them a thousand feet high, and broken into a great variety of spires and pinnacles. In some of these difficult places we were obliged to thread our way through partially-filled crevasses, and to cut steps up nearly vertical escarpments. Dashes up these difficult and dangerous places were made at night or in the early morning when the snow was hard, and the danger from avalanches at a minimum. Between the ice-falls, the grade of the glacier is gentle, but the ice deeply crevassed, thus necessitating many wide departures from the direct route. When crevasses blocked the way we were sometimes obliged to make a detour of half a mile or more in order to advance a few feet. Many narrow snow bridges had to be crossed, where a misstep would have caused a tumble into a seemingly bottomless abyss. These crystal crypts of the vast cathedral among the spires of which we were exploring, were exceedingly beautiful, and called forth many exclamations of wonder and admiration. Even when we had to crawl across some frail arch of snow, for fear it would give way if our weight should be concentrated on a small area, the exquisite beauty and the wonderful coloring of the blue depth below would cause us to pause and admire the delicate tracery of the fairy-like chambers beneath. Although dangers unfamiliar to those who have not lived in high mountains were numerous on the treacherous névés, yet the novelty and constantly varying wonders of the region more than repaid us for the toil and hardship encountered.

The greatest hindrances to our advance were the mists and

clouds that frequently enveloped the mountains and concealed every line of the sublime picture as with an impenetrable veil. With the mists came rain and snow. At such times there was but one thing to do, and that was to wait. When a way ahead free from avalanches could not be chosen, we pitched our tents in the snow and waited as patiently as possible for the veil to be lifted. During these long delays, additional supplies were advanced from lower camps, as opportunity served; but when the line of footprints made during the upward journey became faint and finally disappeared beneath the fine light snow that fell, hour after hour and day after day, with weary monotony, our line of communication was broken. Energy and enthusiasm were then unavailing, and patience became the ruling virtue.

Our highest camp was at an elevation of about 8,000 feet in the vast amphitheatre in which the Newton glacier has its principal source, and was held for twelve days. During the greater part of the time we were enveloped in clouds, and several times our tents became deeply buried beneath the snow. The site of the camp was hastily chosen during the prevalence of a dense mist which rendered it unsafe to continue advancing, as the roar of avalanches from neighboring precipices told that a too near approach to the veiled peaks would be disastrous.

During the twelve days that we lay in our highest camp there was but one opportunity to advance. Starting at two o'clock on the morning of July 24, we climbed the precipitous and deeply crevassed snow-slope, about four thousand feet high, leading from the amphitheatre where our camp was placed, to the divide between Mt. St. Elias and Mt. Newton. Much of the way had been swept by avalanches, and was so steep that steps had to be cut for perhaps half of the distance. From the divide, about 13,000 feet in elevation, an inspiring view was obtained of the vast snow-covered mountains to the north, a region never before seen by man. The day was unusually fine, and the air so clear that Mt. Fairweather, 150 miles distant, stood out so sharply against the dark sky that it seemed scarcely fifty miles away. Thousands of rugged peaks, rising from a general névé region, with an altitude of about 8,000 feet, filled all of the northern and western sky, but Mt. Newton, standing near at hand, shut out the view to the northeast and concealed Mt. Logan. That majestic peak, worthy to bear the name of Canada's famous geologist, came into view later, as we ascended the northern slope of the crowning pyramid of Mt. St. Elias.

The sunlight reflected from the shining snow-fields around us was of blinding intensity. We wore deeply colored glasses to protect our eyes, but our faces, although tanned and weather-beaten by much exposure, were blistered by the intensity of the heat. On account of the rarity and dryness of the atmosphere, however, the temperature in the shade was below freezing. A thermometer thrust an inch or two deep in the snow fell at once to 16° of the Fahrenheit scale. While my companions, Stamy and McCarty, dug a hole in the side of a steep snow-bank in which to place a small lamp for the purpose of melting snow so that we could quench our great thirst, I studied the far-reaching panorama spread out before me and sought to learn some of the secrets of the wild region where so many great glaciers have their birth.

After resting and taking a light lunch, we continued on up the steep slope leading to the summit of Mt. St. Elias, having to cut steps nearly all the way. As we rose above the divide, the view became wider, and at last, when higher than the summit of Mt. Newton, nothing obscured the vast panorama except the peak we were ascending. About four o'clock in the afternoon we reached an elevation of over 14,500 feet, and could have gained the summit had not prudence dictated that we should turn back and advance our camp to the divide between Mt. St. Elias and Newton before making a push for the top. We had already climbed 6,500 feet, since leaving our tent, on slopes so steep that steps had to be cut much of the way. No mountaineer could do more and return to camp without an interval of rest. A change in the aspect of the sky told that a storm was gathering, and as night was approaching, it became imperative that we should regain our camp before darkness rendered it impossible to retrace our steps through the maze of crevasses below the divide. We reached our tent twenty hours after leaving it, and none too soon, as the shadows in the bottom of the amphitheatre were so dense during the last mile of the descent that we could not follow the trail made in the morning, and had to find our camp more by instinct than anything else. Much fatigued, we slept until late the next morning. Renewed storm rendered it impossible to advance our camp to the divide between Mt. St. Elias and Mt. Newton, as we had hoped to do. At last, weary with waiting, we abandoned the hope of reaching the summit and reluctantly retreated toward the base camp at Icy Bay. The descent was made through clouds and rain. The snow was soft and treacherous and travelling exceedingly fatiguing. These discomforts were no greater than we had experienced many

times before, but the feeling that we had failed in our undertaking, took away the buoyancy that encouraged us during the ascent and made us more sensitive to our surroundings. After three long weary marches we regained our old camp-ground at the western end of the Samovar hills, and for the first time in five weeks spread our blankets on a mat of vegetation and inhaled the delicious odors of flowers.

After reaching Icy Bay we made a weary march of sixty miles or more, eastward, along the coast to the head of Yakutat Bay. When near the shore we were obliged to wade many swift, icy streams that threatened to sweep us into the sea, and when seeking to avoid this danger by going farther inland, we encountered rough moraines or had to force our way through tangled vegetation. This portion of our journey was made in the teeth of a cold, north-east storm, and was even more trying to our endurance than our sojourn above the snow-line. At last, after about three months of toil and hardship, during which we had not seen a single human being outside our own party, we reached the Mission at Yakutat and obtained letters from home.